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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,703	09/30/2003	David L. O'Meara	FKL-002	4557

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WOOD, HERRON & EVANS, LLP (TOKYO ELECTRON)  
2700 CAREW TOWER  
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CINCINNATI, OH 45202

EXAMINER
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GEORGE, PATRICIA ANN

ART UNIT	PAPER NUMBER
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1792

NOTIFICATION DATE	DELIVERY MODE
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12/31/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dgoodman@whepatent.com  
usptodock@whepatent.com

<b>Office Action Summary</b>	Application No. 10/674,703	Applicant(s) O'MEARA ET AL.	
	Examiner Patricia A. George	Art Unit 1792	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 November 2007.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,5-18,20,21,23,24 and 30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5-18,20,21,23,24 and 30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay et al (5,712,702).

McGahay teaches a method of monitoring a marker element (10) on the SiO<sub>2</sub> (i.e. quartz) chamber wall, i.e. system component having a material deposited thereon (see col. 1, line 34 and col 3., lines 12-19), **as in claim 5**, in a process chamber (i.e. system) for processing semiconductor substrates; the marker element is exposed to a cleaning gas (18) (i.e. reactant gas) for chamber cleaning process, **as in claim 7**, to form an emission (i.e. erosion) product during the process; the processing system is monitored with use of an optical emission spectroscopy (OES) for the release of the erosion (20) of the marker element (i.e erosion product); and terminating flow of the cleaning gas (22) (i.e stopping the process) when the emission of the marker element is

present in the exhaust gas (release of the removed deposited material i.e. erosion product monitored at a threshold value). See figure 1 and col. 4, lines 32-44.

McGahay fails to explicitly teach emissions are erosion products, as in **claim 1**.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the method of monitoring a marker element, of McGahay, to include the emissions monitored are erosion products, as applicants specifically claim, because one skilled in the art would understand a removal process would also be an erosion process and therefor the byproduct of such a removal process would be an erosion product.

As for **claim 6**, McGahay fails to teach applicants' specifically claimed materials.

McGahay teaches one skilled in the art would have the skill to recognize a change in said materials.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the method of monitoring a marker element, of McGahay, to include any materials an optical emission spectroscopy would be able to monitor erosion products of, such as applicants' specifically claimed Si, because Tao provides evidence that an OES is effective for monitoring Si (see col. 12, lines 16-19), And McGahay teaches one skilled in the art would have the ability to recognize varied materials.

All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in

their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. The prior art included each element claimed although not necessarily in a single reference, and one of ordinary skill in the art could have combined the elements as claimed by known monitoring methods, and in combination, each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable. Further, a predictable use of prior art elements according to their established functions to achieve a predictable result is *prima facie* obvious. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

With respect for **claims 8-9**, the cleaning gas contains NF<sub>3</sub>. See col.3, lines 60-65.

### ***Claim Rejections - 35 USC § 103***

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay et al (5,712,702), as applied to claims 1 and 5-9 above, further in view of Chow et al. (USPN 6,872,322).

With respect for claims 10-11, McGahay teaches conditioning the system. See col. 3, lines 7-9.

McGahay is silent as to the gasses used for conditioning, as applicants' claims 10-11, and silent to the use of HF as an etchant as in claim 13.

Chow teaches use of the reactant gas containing silicon (col. 13, l. 55-60), or NH.sub.3 (col. 9, l. 11, and 26-30), used for conditioning the chamber (col. 12, l. 13-17), and use of HF (col. 8, l. 51) for etching a substrate (col. 8, l. 49) during a substrate etching process.

As for **claim 10**, Chow teaches the exposing comprises the reactant gas containing at least one of a silicon-containing gas (col. 13, l. 55-60) for conditioning the system component during a chamber conditioning process (col. 12, l. 13-17).

As for **claim 11**, Chow teaches the exposing comprises the reactant gas containing at least one of dichlorosilane and NH.sub.3 (col. 9, l. 11, and 26-30) for conditioning the system component during a chamber conditioning process.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the method of monitoring a marker element, of McGahay, to include use of dichlorosilane or a nitrogen containing gas for conditioning the system because Chow teaches as the cleaning process conditions the chamber it creates the byproduct of a passivation layer.

As for **claims 12 and 13**, Chow teaches the exposing comprises the reactant halogen containing gas, HF (col. 8, l. 51), for etching a substrate (col. 8, l. 49) during a substrate etching process.

***Claim Rejections - 35 USC § 103***

Claims 14-17, 20-21, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay et al (5,712,702), as applied to claims 1 and 5-9 above, further in view of Tsai et al. (USPN 6,592,817).

McGahay teaches the exposing of the system component comprise deposition of a film on a work piece (i.e. depositing a film during a substrate film formation process). See Abstract.

McGahay is silent as to applicants' specifically claimed process parameters.

As for **claim 14**, Tsai teaches the reactant gas containing at least one of a silicon-containing gas (col. 10, l. 63) and a nitrogen-containing gas for depositing a film (col. 10, l. 3) during a substrate film formation process (col. 12, l. 3).

As for **claim 15**, Tsai teaches the reactant gas containing tetraethyl orthosilicate (TEOS) (col. 15, l. 7-15) for depositing a film during a substrate film formation process.

As for **claim 16**, Tsai teaches during a thermal deposition process, a hot liquid is circulated through the chamber walls to maintain the chamber at elevated temperatures (col. 11, l. 46-49).

As for **claim 17**, Tsai teaches operating the processing system at a chamber pressure of 20 Torr, which is encompassed by the claimed range of between 10 mTorr and about 760 Torr during the exposing (col. 7, l. 33).

As for **claim 20**, Tsai teaches the monitoring comprises using an optical monitoring system to detect light absorption of the erosion product (col. 5, l. 61-63).

As for **claim 21**, Tsai teaches the monitoring further comprises determining if the intensity level of the light absorption (col. 9, l. 54-58) has reached a threshold value (col. 9, l. 55-56 describes the transistor may be tailored which is written on the limitations of a desired threshold value).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the method of monitoring a marker element, of McGahay, to include any process parameters, including those claimed by applicants, because Tsai teaches such process parameters are known, and one in the art would have the skill to determine relevant process parameters through routine experimentation in the absence of a showing of criticality

As for **claim 30**, Tsai teaches all the elements of monitoring the release of halide species erosion products, such as silicon halide and silicon oxyhalide of claims 29 and 30. Tsai teaches the deposition of silicon and silicon oxide (col. 3, l. 37 and 41) in the process chamber (col. 3, l. 32), the presence of halide ion (claim 8) which are contributed by etchants which are free fluorine radicals,  $\text{NF}_3$  (col. 3, l. 50), then by conversion of gas to dissociated species (col. 3, l. 47-49), are monitored (claim 43) as a halide species erosion product. Because the chemistry of halide species erosion products are present and monitored, halide species erosion products such as silicon halide and silicon oxyhalide exist.



***Claim Rejections - 35 USC § 103***

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay et al (5,712,702), as applied to claims 1 and 5-9 above, further in view Kim et al. (USPN 6,436,303).

McGahay teaches the use of quartz system components (see discussion of claim 2), but fails to disclose the process parameters as in claim 18.

Kim discloses the chamber operates at 200 mTorr to about 760 Torr (col. 7, l. 38), at the temperature of 200 to 800.degree C. (col. 7, l. 39-40), as defined by **claim 18**.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the method of monitoring a marker element, of McGahay, to include any process parameters, including those claimed by applicants, because Kim teaches such process parameters are known, and one in the art would have the skill to determine relevant process parameters through routine experimentation in the absence of a showing of criticality.

***Claim Rejections - 35 USC § 103***

Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGahay et al (5,712,702), as applied to claims 1 and 5-9 above, further in view of Nakata et al. (USPN 5,989,928).

McGahay is silent as to the components of the monitoring spectroscopy system using a gas mass sensor, as in claims 23-24.

As for **claim 23-24**, Nakata teaches monitoring by spectroscopy, using a mass sensor to detect a mass signal from the erosion product (col. 1, l. 37-42), and determining if an intensity level has reached a threshold value (col. 6, l. 27-29), which is written on the limitation "mass signal".

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the method of monitoring a marker element, of McGahay, to include how the spectroscopy function, including the functions claimed by applicants, because McGahay teaches it is known for spectroscopy to function in the same manner, and one in the art would have the skill to determine such relevant details of spectroscopy through routine familiarity of the monitoring system in the absence of a showing of criticality.

### ***Response to Arguments***

Applicant overcomes the Ludviksson publication, on page 7, stating the application Serial No. 10/674,703 and U.S. Patent Application No. 10/331,456 (published under Publication No. US2004/0125360)(the Ludviksson publication) were, at the time the invention of Application Serial No. 10/674,703 was made, owned by Tokyo Electron Limited (Tokyo, JP). Please see the new grounds for rejection above.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia A. George whose telephone number is (571)

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272-5955. The examiner can normally be reached on Mon. - Fri. between 8:00 am and 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



PAG12/07

Patricia A George  
Examiner  
Art Unit 1792

**NADINE G. NORTON**  
**SUPERVISORY PATENT EXAMINER**

